

their full activity till they have arrived at maturity. What surprises me is, that in spring I find a much larger number than I find now (September). I see none, for instance, in a state of infancy. I may add, that in spring it is principally in a kind of reddish scum, which accompanies the green matter, that I meet with the greatest number of *Naviculæ*, and that now I find less of this scum, which perhaps depends upon the fact that the water in the basin is more agitated in summer,—a time when the water is incessantly pumped up for invalids.

“As regards the marginal striæ, I offer the following remarks:—M. Quatrefages, who has been at Vichy for his health, examined the Algæ with me, and has endeavoured to discover if the *Naviculæ* really possess these striæ. By the help of oblique illumination, we have clearly established their existence, at least in some individuals. We are not certain that they are present in all, for on some we have seen them distinctly on one side only and not on the other, while in other individuals we have not been able to discover them on either. I cannot doubt then, that at least a certain number of *Naviculæ* do not present striæ, though they are perceptible sometimes on either margin, sometimes on one only. M. Quatrefages, equally with myself, has observed the movements which I have described. Finally, the endochrome in the living organism is not green but yellow, exactly, in fact, as you see it in the dead specimens.”

Hoping that the worthy author will be indemnified for the considerable outlay which the publication must have cost him, we commend this work to the attention of our botanical friends.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

March 13, 1855.—Dr. Gray, F.R.S., Vice-President, in the Chair.

AN ARRANGEMENT OF THE FAMILIES OF ECHINIDA, WITH DESCRIPTIONS OF SOME NEW GENERA AND SPECIES.

BY DR. JOHN EDWARD GRAY, F.R.S., V.P.Z.S., P.B.S. ETC.

MM. Agassiz and Desor have given the generic characters and a list of the species of *Echinida*, but do not divide the genera of the normal division into families. I propose to divide them into the following groups.

The *Echinida acrocystos*, or those which have a vertical dorsal vent, a regular globular body, with an inferior central circular mouth, armed with conical jaws, furnished with five elongate acute teeth, and with the ambulacra forming continuous vertical bands from the mouth to the vent. They may be divided into the following families.

I. *Tubercles of spines perforated; spines elongate; body circular.*

Fam. 1. CIDARIDÆ.

Ambulacra narrow, formed of double pores; interambulacral plates few, with a single large tubercle; spines thick, solid.

1. *Cidaris*. Tessera even-topped.
2. *Goniocidaris*. Tessera bevelled on the edge.—*G. pistillaris*.

Fam. 2. DIADEMADÆ.

Ambulacra narrow, of one series of double pores; interambulacral plates numerous, with two or more rows of tubercles; spines slender, often tubular.

1. *Astropyga*. Body depressed; ambulacral area with very small crowded tubercles, bearing very thin spines, much smaller than the interambulacral spines and tubercles; interambulacral area with smooth bands.

2. *Garelia*. Body depressed; ambulacral area narrow, with two or four series of small tubercles, and thin spines; interambulacral area with oblique series of large tubercles and spines, but without any smooth band; spines tubular.

3. *Diadema*. Body globular or subdepressed; ambulacral area with the same sized tubercles and spines as the interambulacral area.

II. *Tubercles imperforated.*

Echinidæ, Gray, 1828.

Fam. 3. ARBACIADÆ.

Ambulacral area narrow; ambulacra narrow, with a single series of double pores; body circular; spines short, solid.

1. *Agarites*. Upper surface of the interambulacral area without tubercles.

2. *Arbacia*. The upper and lower surface of the interambulacral area covered with tubercles.

Fam. 4. HIPPONOIDÆ.

Ambulacral area as wide as the interambulacral; ambulacra wide, formed of three separate vertical rows of double pores. Body circular; shell thin.

1. *Amblypneustes*. Body high; porous zones not quite regular; mouth small, entire.—*A. ovum*.

2. *Boletia*. Body depressed; porous zones regular, inner separated by a vertical series of tubercles; mouth very large, with five deep slits.—*B. pileolus*.

3. *Hipponoë* (Gray, 1841). Body swollen; two outer porous zones regular; middle one interrupted; mouth small, slightly cut.—*H. Sardica*.

4. *Holopneustes*. Body swollen; two outer porous zones regular; middle one separate or interrupted; mouth small, entire.—*H. porissimus*.

Fam. 5. ECHINIDÆ.

Ambulacral area half as wide as the interambulacral area, with two (or three) close series of double pores, placed in threes; buccal membrane naked; body circular.

A. *With angular pores at the junction of the plates.*

1. *Mespilia*. 2. *Microcyphus*. 3. *Salmacis*. 4. *Temnopleurus*.

B. *Without any pores at the angles of the plates.*

5. *Echinus*. 6. *Psammechinus*. 7. *Heliocidaris*.

Fam. 6. ECHINOMETRADÆ.

Ambulacral area only half as wide as the interambulacral area ; ambulacral pores in groups of four or more, forming an arched series round the ambulacral tubercles.

A. *Body circular.*

1. *Strongylocentrotus*. Spines equal, subulate, short.

B. *Body oblong.*

2. *Echinometra*. Spines subulate, subequal.

3. *Holocentronotus*. Spines of back elongate, subtriangular ; of the oral side large, spathulate.

4. *Colobocentrotus*. Spines of the back very short, truncated ; of the oral side spathulate.

Dr. Gray described the following species, which he regards as new, from the British Museum Collection.

Genus CIDARIS.

* *Spines smooth or granular.*

1. CIDARIS ORNATA.

Depressed. Tubercles of interambulacral area rather distant ; spines lanceolate, subulate, depressed, white, red-ringed ; base with series of small red spots and with regular longitudinal series of granules ; each side with one, and the upper surface of the base with two series of white angular spines ; spinules white, with a central red streak.—*Hab.* East Indian Seas.

** *Spines verticillate-spinose.*

2. CIDARIS VERTICILLATA.

Depressed. Interambulacral tubercles rather far apart ; spines of upper surface rather elongate (about as long as the diameter of the body), subulate, smooth ; some subulate at the top, others with scattered conical spines, others obliquely truncated, cupped, and spinose at the tip ; spines of lower surface shorter, cylindrical, truncated, granular near the tip ; those of the oral surface much spotted, truncated, compressed and largely granular near the end.

Hab. — ?

3. CIDARIS ANNULATA.

Orange. Rather depressed. Interambulacral tubercles of moderate size, far apart ; spines elongate, subulate, tapering, red and white ringed ; suprabasal ring white ; with longitudinal ridges. The ridges of the lower half of the spines spinulose and with scattered larger

spines; sometimes placed in lines. The dorsal spines sometimes truncated and slightly cupped at the tip; ambulacral spinules narrow, flat.

Hab. West Indies.

4. CIDARIS SPINULOSA.

Interambulacral tubercles small, very far apart; spines elongate, fusiform, red-brown, with close squamose longitudinal ridges and scattered subverticillate acute and small spines; the dorsal spines truncated, cupped and spinose at the end; ambulacral spinules narrow.—*Hab.* —?

Genus ASTROPYGA.

5. ASTROPYGA DEPRESSA.

Shell depressed, very thin; ambulacra swollen; interambulacral area with a very wide smooth band in the middle and on each side of the upper part; the lower part of the centre of each area with three oblique series of larger tubercles; ovarian plate broad, triangular.—*Hab.* —?

Genus GARELIA.

Ambulacra broad; the pairs of pores crowded, so as to form two, or rarely three, series; ambulacral area narrow, upper part with four series of small, and lower part with two or four series of rather larger tubercles; spines of ambulacral area bristle-like, very slender; interambulacral area with several oblique series of larger tubercles, without any smooth band on the back near the crown; ovarian plates moderate, triangular.

* *Ambulacra convex; area linear; spines elongate, subulate, hollow, covered with whorls of lanceolate scales.*

6. GARELIA ÆQUALIS.

Ambulacra convex; ambulacral area with two series of tubercles, the outer series rather the largest, rather narrowed below; upper side of ambulacral area with 5·5 oblique series of larger tubercles; ovarian plate elongate trigonal; spines purple, or purple and white ringed.

Var. α. With spines pale, white-ringed.

Var. β. Spines purple; underside obscurely pale banded.

Var. γ. Spines purple, not banded.

Hab. Mauritius.

** *Ambulacra flat; area wide, with four or five series of spines, near vertex narrow, with two series of tubercles below; spines subulate, tapering, longitudinally striated.*

7. GARELIA CLAVATA.

Interambulacral area with four oblique series of larger tubercles; ambulacra slightly raised; the upper part of the area near the crown broad; each side with two or four or six series of small tubercles; the lower part narrow, with a single series of rather larger tubercles.

GENUS TOREUMATICA.

* *Transverse sutural grooves wide and deep; back granular.*

8. TOREUMATICA HARDWICKII.

Transverse sutural groove deep, wide; tessera of interambulacral area high, about twice as broad as high, with one large and several scattered unequal smaller tubercles.

Hab. —? Presented by General Hardwicke.

** *Transverse sutural grooves narrow and small; back equally granular.*

9. TOREUMATICA GRANULOSA.

Transverse sutural groove narrow and shallow; interambulacral tessera with a subcentral row of large, and numerous nearly equally scattered smaller tubercles. Near the circumference the secondary tubercles become more distinct. Base concave.

Hab. —?

*** *Transverse sutural grooves indistinct; back equally tubercular.*

10. TOREUMATICA REEVESII.

Depressed, thin; tessera of interambulacral area with a single series of large, and several unequal-sized smaller tubercles. Under-side rounded, concave in the middle; ambulacral area with two, interambulacral area with three rows of subequal tubercles; holes between tessera distinct, between ambulacral tessera circular and deep.

Hab. China. Presented by J. R. Reeves, Esq.

**** *Transverse sutural grooves indistinct; back with a smooth band, near the suture between the interambulacral areas.*

11. TOREUMATICA CONCAVA.

Depressed, thin; middle between two interambulacral areas on the back smooth; interambulacral tessera with a few unequal tubercles near the ambulacra. Under-side deeply concave, largely tubercular; ambulacral area with two, interambulacral with three series of large tubercles.—*Hab.* China.

BOTANICAL SOCIETY OF EDINBURGH.

January 10, 1856.—Colonel Madden, President, in the Chair.

The following papers were read:—

1. "On some Species of *Epilobium*," by Charles C. Babington, M.A., F.R.S. &c. (See page 236.)

2. "Observations on the Pollen Tube, its growth, histology, and physiology," by P. Martin Duncan, M.B. Lond., F.G.S. &c.

The author details experiments made on *Tigridia conchiflora*. In this plant the style and stigma are at least 4 inches in length, and after the lapse of fourteen hours from the application of pollen-grains,